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# ECONOMIC BOTANY, CONSERVATION, AND DEVELOPMENT: WHAT'S THE CONNECTION?<sup>1</sup>

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## ABSTRACT

The frameworks commonly used for understanding the causes of biodiversity depletion are inadequate. This paper offers some alternative frameworks for understanding biodiversity depletion, conservation, and the roles of states, local communities, and economic botanists. Wild resources are economically important to many rural communities, and a wide range of common property tenurial systems for managing and allocating those resources have been developed. Economic botanists have documented wild plant resources, their uses, and their management. This information has primarily been used by people outside local communities who are interested in commercial enterprises and economic development. But by not paying attention to the question of tenurial rights over natural areas, wild resources, and knowledge about those resources, economic botanists indirectly participated in colonial expansion and the marginalization of indigenous peoples by neocolonial states. Today, economic botanists have opportunities to participate in efforts to recognize and document property rights to land and forest. They also have opportunities to recognize and support intellectual property rights over medicinal plant knowledge and crop varieties, although the potential application and conservation benefits of intellectual property rights are as yet unclear. Efforts to link conservation of biodiversity with development are stimulating collaborative partnerships among economic botanists, social scientists, ecologists, governments, and local communities.

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The linkages between economic botany and economic development are generally conceived as linkages through knowledge about crops: major crops and their domestication and evolution; and new crops that could be promoted for the development of new products. Discovery of wild plant products that could be commercially exploited has been a standard second dimension of that linkage. The linkages between economic botany and conservation are less often considered, perhaps because the production of economically valuable plant products, particularly crops, is tied to habitat conversion which generally reduces biodiversity levels. Linkages between economic botany and conservation have primarily been forged by researchers interested in the conservation of crop genetic resources. A negative conservation linkage commonly recognized is the pattern of depletion of plant populations because they are economically valuable.

Edgar Anderson, who is honored at this symposium, showed us that it could be difficult to see

what you are looking at, that there could be unexpected order in what seems disordered or unimportant, that it is easy to overlook the obvious. In this paper, I focus on something that has generally been overlooked by botanists working in the tropics, and is hence an unseen dimension of the linkages between conservation, development, and economic botany. Specifically, I focus on how rights to "common property" resources have been invisible to economic botanists and how that vision is changing. Recognition of common property management systems in turn leads us to recognize the positive linkage between conservation and economic botany—traditionally communities have been concerned about conserving plants that are valued locally for economic and other benefits.

I hope that my paper, like much of Edgar Anderson's work, is a bit controversial and that it stimulates the reader to think about the issues I raise. Most of the world's biodiversity lies outside protected areas and is under increasing threat. I

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<sup>1</sup> I thank the organizers of the symposium for the invitation to speak. This paper summarizes a portion of a larger work in progress, a book entitled *Ethnobiology: Community, Culture, and Conservation* to be published by Columbia University Press. I thank all those who have commented on parts of that longer manuscript. In particular, I thank Owen J. Lynch for teaching me to pay closer attention to tenurial rights. I assume full responsibility for this paper. The conclusions expressed herein should not be attributed to World Wildlife Fund or to the U.S. Agency for International Development. I dedicate this paper to the memory of my father, Bruce F. Bristol, who passed away on August 15, 1993.

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make generalizations based on my own and others' research, and I draw on discussions with people in the field. Making generalizations can be risky business. Generalizations blur the rich detail of case-specific situations and mask variation. They simplify complex situations. Exceptions can always be found. Nonetheless, generalizations can be valuable, because they also offer a new model against which to compare specific cases. Such comparisons can result in revised and refined generalizations. Whether we realize it or not, we are already framing our understanding of new situations based on existing generalizations that have not been made explicit. In this paper, I try to identify the existing frameworks and make an effort to define a more useful one. Given the urgency of the biodiversity crisis, it behooves us to step back and consider whether general patterns offer lessons that might improve conservation efforts.

#### TROPICAL FORESTS: THEIR USE AND MANAGEMENT

The tropical forests that we botanists love are beautiful and varied. The diversity of the dry forests of Africa, the mangroves of Central America and Southeast Asia, and the rainforests of Amazonia inspire us to understand them and their component species. But sometimes we forget that people live in these forests. They have lived there for thousands of years, and they live there now. These forests are their homes and the source of their livelihoods. While global maps of tropical forests show vast expanses of green belts around the Earth's equator, field biologists know you do not find unbroken primeval forests throughout this belt. Tropical forests vary greatly in size. They may be large or small, blocks or narrow, fingerlike corridors along rivers or ridges. At one end of the size scale stand the forests of Papua New Guinea, Indonesia, Central Africa, and Amazonia, where large swathes of forest occupied by indigenous peoples are being opened by loggers, oil companies, mining operations, and resettlement programs. In some places, these forests are highly diverse biotic communities; and in other places, the forest is very disturbed but nonetheless undergoing a natural process of succession. At the other end of the scale are the smaller forests of Ghana, Thailand, and Mexico, for example, which range from a few hectares to hundreds or thousands of hectares that stand as islands in land under nonforest use.

An estimated 200 to 500 million people live in the midst of the world's tropical forests (Lynch, 1990), and they use the forests and forest plants. Most of these forest-dwelling people are also farm-

ers. They grow cereals like rice and maize, or root crops, like manioc, sweet potato, taro, and yams. Regardless of their main crop, they all depend on forests for material goods, food, and the definition of their identity. Indigenous forest people's dependence on forest and field is evident in ritual exchanges of field and forest products. For example, when the Bora of the Peruvian and Colombian Amazon have a ceremony or meeting that includes two different communities, the two ritually exchange manioc bread and pineapples from one community's gardens for the other's forest products like fish, insects, and game. This exchange signifies recognition of mutual interdependence between Bora communities, as well as between the human and forest communities.

The remaining regions of intact forest often overlap with areas used and claimed by indigenous communities. The term "indigenous" is used here to refer to long-term<sup>3</sup> residents of a given place. In parts of Africa, Europe, Asia, the Arctic, and the Pacific, the majority population is indigenous, and different indigenous communities from those now present may have used forests in the past. In the Americas, indigenous forest-dwelling communities are usually marginalized, minority native Americans who are remnants of the original indigenous groups that survived conquest by Europeans and subsequent marginalization by neocolonial states. In Latin America, there are also indigenous peasant communities of mixed ancestry that rely on forests and have developed methods for managing them, often by learning from their indigenous neighbors or relatives. If it were possible for a satellite image or aerial photo to show not only the forest structure at a given place but also the tenure structure and the community organizational structures that exist in forested areas, then we would have a much better picture of the world's forests. If on top of that we could overlay the past and present forest users (including indigenous and outsider users, and the final end-users in other countries) as well as the *de jure* and *de facto* tenurial rights exercised over the areas in question, and the status of common property management systems

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<sup>3</sup> The exact definition of long-term depends on the context and the classes of residents being compared. In many situations, long-term could reasonably be defined as at least two generations, approximately 40 years. In other cases, where conflict between a new group and an older group that has been resident for centuries is longstanding (lasting for generations), the definition of indigenous would not be applied to the interlopers whose rights to the resources have been contested for generations.



in place, then we would have an even better starting point for understanding forest dynamics and the factors behind the loss of biodiversity. But such overlays do not exist, and analyses of forest depletion are often based on incomplete information about forest users.

Indigenous residents in forested areas use the forest and its products for multiple purposes. For example, the Mexican Huastec Maya name nearly 90% of plants available in their environment (Alcorn, 1984). Two-thirds of those plants (forest and non-forest plants) have uses. While you might assume that people just go out and look for a plant when they want to use it, find it, bring it home, and use it, forest-dwelling communities manage their use of ecosystems to ensure that a wide variety of useful species are available. In communal lands owned by the Huastec, one-third of available plant species are "managed for"—in the sense that people plant or protect those species in order to maintain them within the habitats created by their general agricultural and forestry management practices (Alcorn, 1981). In the Huastec case, about one-third of available plant species are found in the forest, and 90% of forest species have specific uses (Alcorn, 1983). This level of plant knowledge and interest in maintaining useful species is generally typical of indigenous forest dwellers around the world (cf. Balée, 1994; Conklin, 1954; Messerschmidt, 1993; Warner, 1991).

Forests provide food in the form of fruits, river products including fish and reptiles, and game that can be shot in the forest or trapped in gardens scattered in the forest. Forests provide mushrooms, and edible greens and roots. Studies of forest dwellers around the world show that it is common for forest foods to make up between 50% and 80% of nutritional intake, with the higher percentages going to women, children, and poor people (Scoones et al., 1992). Certain forest leaves and roots can be burned together to produce ash that is used for salt. Forests also provide forage for forest dwellers' animals and for the animals of pastoralists that move through forested areas.

Beyond food, forest plants have numerous other uses. Plants with flowers that we find beautiful or interesting for evolutionary insights provide homes for forest people. The forest itself serves as backyards and playgrounds for children, and as workplaces for their parents. Forest plants are used to make the skeleton of a house, to lash house parts together, to thatch roofs, and to construct walls. Forest plants provide fibers used for producing household items like bags, carrying baskets, and bark cloth. Bark cloth still has ritual importance

in many forested areas of the world. Large forest trees are used to make drums for communication and canoes, which serve for communication and transport. Forest dwellers generally use fresh plant and animal materials as medicine. When someone is ill, they go into their forests and gardens to collect and process fresh material daily for as long as it is necessary. The medicine is available if the habitat in which it grows has been preserved.

Local communities generally value forests beyond the products that are immediately harvested: They value forests for serving as living factories from which products can be harvested, for the natural regenerative processes that subsidize agriculture, and for their ecological function. Forest dwellers incorporate the forest into their land use systems. Swidden agriculture, also known as slash and burn, was long vilified as destruction of the forest by those who think of forest as a permanent group of standing trees. This attitude is changing as people realize that forests are really a process, a community in flux, not a permanent object (Warner, 1991). Traditional slash-and-burn farming is based on the use of forest processes (Alcorn, 1989). It begins by slashing and burning, but it depends on forest regeneration. Opening up a gap in the forest is just one small step in swidden farming. Forest dwellers often use long fallow systems that rely on natural regeneration, which is regulated at different rates across the original cleared plot. For example, among the Bora, the original opening in the forest that was planted the first year often begins regeneration in some but not all areas during the first year (Denevan et al., 1984). After several years, secondary forest covers all but the central area, which is left as a garden or agroforestry plot that contains planted fruit trees, as well as native species that came up after clearing or were protected during clearing. These kinds of complex agroforestry systems are built into swidden agriculture systems around the world (Alcorn, 1990; Messerschmidt, 1993; Olofson, 1983; Shepherd, 1992; Warner, 1991). Over generations, forest peoples often create complex anthropogenic forests that contain higher than expected numbers of useful native species, as well as introduced species.

Communities are aware of their dependence on the forest; they have altered land use and livelihood strategies in order to retain forests using methods including intensification of agriculture on non-forest lands, increased reliance on income from outside jobs, and dedication of more land to natural forests. Another common option is to go to a short fallow swidden system in order to set aside some permanent forest. In the short fallow system, fields



are fallowed for only three to five years. Native trees are protected when the fallow is slashed. Planting is done among pollarded and protected trees, and rapid secondary succession is encouraged. In these systems, agricultural fields are managed so that firewood can be harvested from native, fast-growing trees that coppice. In other cases, forest dwellers opt to intensify agriculture in permanent fields, sometimes by investing labor in creating terraces. Intensification enables them to retain, enrich, and even expand permanent forests (Padoch, 1993).

Forest products are not just managed for local use. Medicinal plants and trees that produce marketable fruits, resins, and other products are managed for sale or trade into local or regional markets. Animal skins and meat are sold to buyers who come seeking products for outside markets. Orchids and other plants are sold for ornamental uses in urban settings. High demand for such nontimber forest products can severely degrade forests, especially in cases where communities are denied the right to police extraction from their resource base.

The level of exploitation by outsiders without a long-term dependence on the local resource is often of another magnitude of impact and highly unsustainable. Sometimes outsiders just gather bags of medicinal plant samples for phytochemical and pharmacological testing for the international market. If the medicinal plant becomes commercially valuable, however, laborers hired by collecting firms can severely reduce the populations of that species to the point where local people no longer have access to the medicine (Cunningham & Mbenkum, 1993). More often, outsiders come into forests and claim the land, remove the forest, and create orange groves, plantations, or pastures. Degraded natural forests often have the potential for regeneration, but after conversion to plantation or pasture, the levels of biodiversity are generally low and regeneration of forest is unlikely.

Community-based logging for local use has had minimal impacts; community-based logging for profit also has the potential to be sustainable in communities that are concerned about long-term productivity and have strong tenurial rights over the resource (Bray, 1991). Logging by state-sponsored concessionaires, on the other hand, is usually carried out with minimal concern for long-term productivity and leaves the land with open access for settlement after the original tenurial rights have been broken. Such logging often continues even after public outcry against ecological degradation and the loss of biodiversity. In Thailand, for example, a logging ban was enacted after widespread

community protests against overlogging by government-sponsored concessionaires in community forests (Lohmann, 1991). Yet logging continues in Thailand. Logs are taken into Burma and stamped as Burmese. They are then returned across the border into Thailand and sold as imported logs, since it is illegal to log in Thailand. The Thai military elite also finance and carry out logging in Burma, Cambodia, and Laos to profit from Thai market demand. In Asian and Central African forests, logging is usually done by powerful interests with links to government and the military.

Radical land use change accompanied by severe depletion of biodiversity is the type of land use against which we must compare the land use of marginalized indigenous communities that live in relatively biodiverse areas. Plantations of fast-growing pulpwood trees, rubber, oil palm and fruit, industrial logging operations, cattle ranches, and urban sprawl have rapidly transformed massive swathes of the biosphere from rich reservoirs of valuable species diversity into empty banks of weeds and crops. For thousands of years, indigenous communities have used and modified biotic communities through their land use practices, but they are not responsible for the biodiversity crisis that faces the world today.

#### CONFLICTS OVER PROPERTY RIGHTS TO FORESTS

The general patterns of forest use are similar around the world, and there are two general classes: (1) use by local communities; and (2) use by commercially oriented outsiders.

Communities rely on local forests for food, medicine, construction materials, craft materials, fuel, insurance, and products for sale/trade—in other words, a significant portion of their livelihood. Yet these uses and the rights to these forests often go unrecognized by outsiders. Local user communities often respond to reduced availability of needed forest goods and services by attempting to manage the resource for long-term sustainability if they have the tenurial rights to make decisions to control forest and land use.

Commercial operations extract the same products used by local people, but they generally exploit them for short-term profits without concern for long-term sustainability. The commercial harvest of these products, particularly extraction of timber and nontimber products by large companies, increasingly leads to depletion of forests. Extraction of commercially valuable medicinal plants has also led to depletion or local extinction of populations of those species (Lewington, 1993).



A third user class has recently been asserting its rights. Global uses of forest ecosystems have recently been recognized for achieving conservation of biodiversity and for carbon sequestration to mitigate against global climate change. The global community is increasingly claiming rights to manage forests for these uses. At a 1992 conference in Washington, D.C. (Doyle & Schelhas, 1993), North American biologists suggested that they should write "owners' manuals" for tropical forests.

As the paragraphs above make clear, forests and forest species are useful. But who owns these forests and who benefits from using and conserving this biodiversity? Forest use has led to conflicts over rights to make decisions about forest use and management, rights we may gloss as forest "ownership." While we may think of "ownership" as the "right to sell something," tenurial specialists refer to ownership or tenure as a bundle of rights and obligations as recognized or distributed by some authority (e.g., local authorities or the state). Tenure defines relationships between people and mediates their use of natural resources (Crocombe, 1971); tenure does not define relationships between people and property. Those with tenurial rights have a specific relationship to others in terms of "who" can (and cannot) "do what" and "under what circumstances" with the property in question.

Local conflicts over resources have led to the evolution of local tenure systems and supportive social mores appropriate to the culture and sociopolitical organization of the community (Berkes, 1989). What are some of the characteristics of these local tenure systems? And why are they resource conservative? Traditional tenure systems are in effect a partnership between individuals and the community to maintain a community's resource base by limiting access and imposing restrictions on forest use. Traditional tenure systems are extremely variable, complex mixtures of private and community rights (Crocombe, 1971). It is not simply that community members share joint ownership; rather, different community members have different rights and obligations. And different kinds of rights are exercised over different kinds of resources. Agricultural lands, for example, are often held by individual families, while rights to forest or pasture lands are more likely to overlap. These overlapping rights result in a sharing of benefits across a broad range of the community. Claims to a given patch of forest or even particular trees may be held by several different people, or different groups of people, at different times of the year, for example. These overlapping claims work to

exclude non-community members and protect the community from easy acquisition by outsiders, or from exclusive use by any individual who might destroy the community's forest resource base.

Customary tenure systems vary widely from place to place, yet they are similar in that they derive their legitimacy from the community's authority. Resource rights are inherited in complex ways, and bundles of rights often get reorganized in each new generation. Customary rights and obligations evolve with the changing availability of the resource, changing demands for the resource, and changing relationships between user communities. If forests are under stress, local regulations are often established and then enforced by local forest protection committees. The effectiveness of these common property systems depends on widespread acceptance and adherence to rules governing access, strong local institutions that administer local justice, and guidance by local leaders committed to the values of the system. Some have described traditional tenurial systems as a form of "institutional capital" (Field, 1984), because compliance is sustained with low investment on enforcement.

Community institutions, authority, and rights to forests, however, are almost invariably ignored when decisions about forests are made at the national level or in the context of colonial expansion. Such national-level decisions lead to conflicts both between the state and the community and within and between communities. These conflicts are very old. For example, in the late 1500s, Guatemalan communities argued in Spanish colonial courts that their forests should not be given over to Spaniards for conversion to pasture, because these forests belonged to them and were an integral part of their productive base (M. J. MacLeod, pers. comm., 1992). The same arguments can be found in the historical literature from Europe (Westoby, 1989), Africa (Porter et al., 1991), and Asia (Scott, 1976). Today, communities make the same arguments in the face of forest alienation for state-sanctioned logging, mining and petroleum ventures, plantations, and colonization or resettlement programs. In 1993, the Embera, Kuna, and Wauna communities in the Darién region of Panama mapped their forests in an effort to register their rights to ancestral lands in the face of settler encroachment and the threatened completion of the last segment of the Panamerican Highway (Denniston, 1994). The forest protection committees established by communities to exclude their neighbors and regulate community forest use are usually unable to keep out powerful outsiders.

The historical trend is similar around the world.



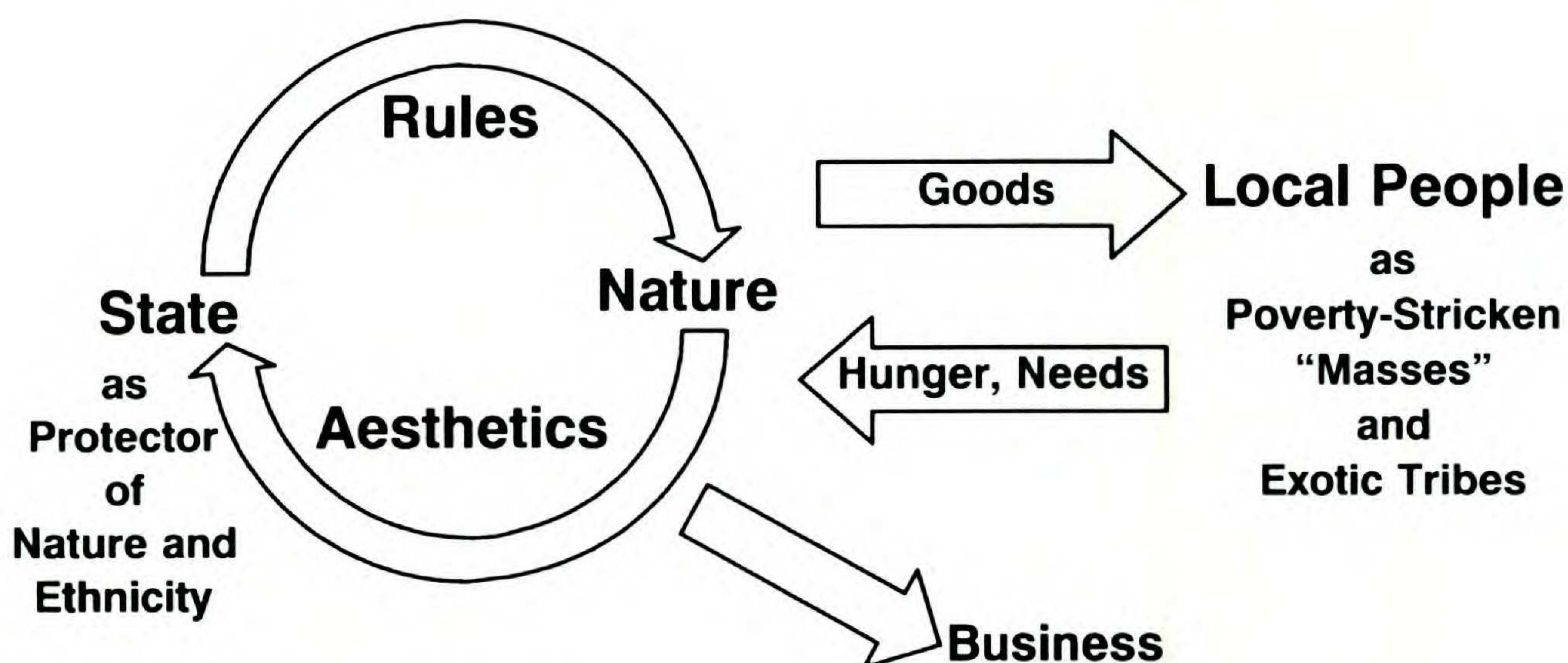


FIGURE 1. Analysts' standard frame for conservation discourse. This model is inadequate for depicting causative relationships or generating viable solutions.

Initially, despite the fact that forests and adjacent agricultural lands were being administered under traditional tenurial systems, named in local languages, and claimed by local peoples, colonial authorities and/or the neocolonial state limited communities to certain specified forest product "usufruct rights" which were then downgraded to "privileges." Guha (1983) lucidly described this process in India, for example. Eventually, states deny resident communities any rights or privileges in the state's forest, except perhaps temporary employment as laborers. In other cases, the forest is turned directly over to government-sanctioned concessionaires, ranchers, or plantation companies; and communities immediately lose rights to their forest and become labeled "squatters" instead of being recognized as holders of any property rights at all. When community authority was usurped by the state, community property became transformed into "no one's property," no one took responsibility for long-term forest management, and forest degradation ensued. Hardin's (1968) famous "Tragedy of the Commons" model was really about the tragedy of "open access" (Berkes et al., 1989, and others). Many forests were well managed under common property regimes, but they were transformed into open access forests after logging or development projects ignored, and thereby invalidated, local systems of forest control. Once under open access, their biodiversity has been depleted by all and sundry, locals and outsiders.

#### ANALYTICAL FRAMEWORKS

In summary, plants are useful to people who live in biodiverse areas. Useful plants are managed

by people so the plants are sustainable. People have developed complex agricultural systems that incorporate wild plants, and communities have developed their own systems of tenure to govern the extraction of plants under common property regimes. But common property regimes have been overridden by states who have claimed rights over those resources.

How does this information fit into the ways we commonly think about depletion and conservation of biodiversity? Figure 1 shows the standard conservation discourse frame—the way that people usually talk about biodiversity loss and plan what can be done to stop it. The major players are identified as the state, nature, and the hungry, growing population. The state is envisioned as the protector of nature through enforcement of rules in order to preserve nature for its aesthetic values. The state enacts regulations and sets aside land for national parks, reserves, and wildlife sanctuaries. Rural people are portrayed as poverty-stricken masses that are hungry and needy. They have no apparent organizations or local institutions. Their communities' sociopolitical structures are invisible. As their numbers increase, or their cash needs increase, the model predicts that rural masses will extract more and more goods until nature is destroyed. If forest dwellers are included in the analysis, the standard discourse frames them as exotic tribes having aesthetic value in their "ethnic" customs and colorful costumes whose aesthetic ethnicity should be protected. Business, if it is mentioned, is seen as a minor player. Corruption of state officials in performing their responsibilities is sometimes raised as an issue, but rural people living near or in nature reserves receive the bulk of the



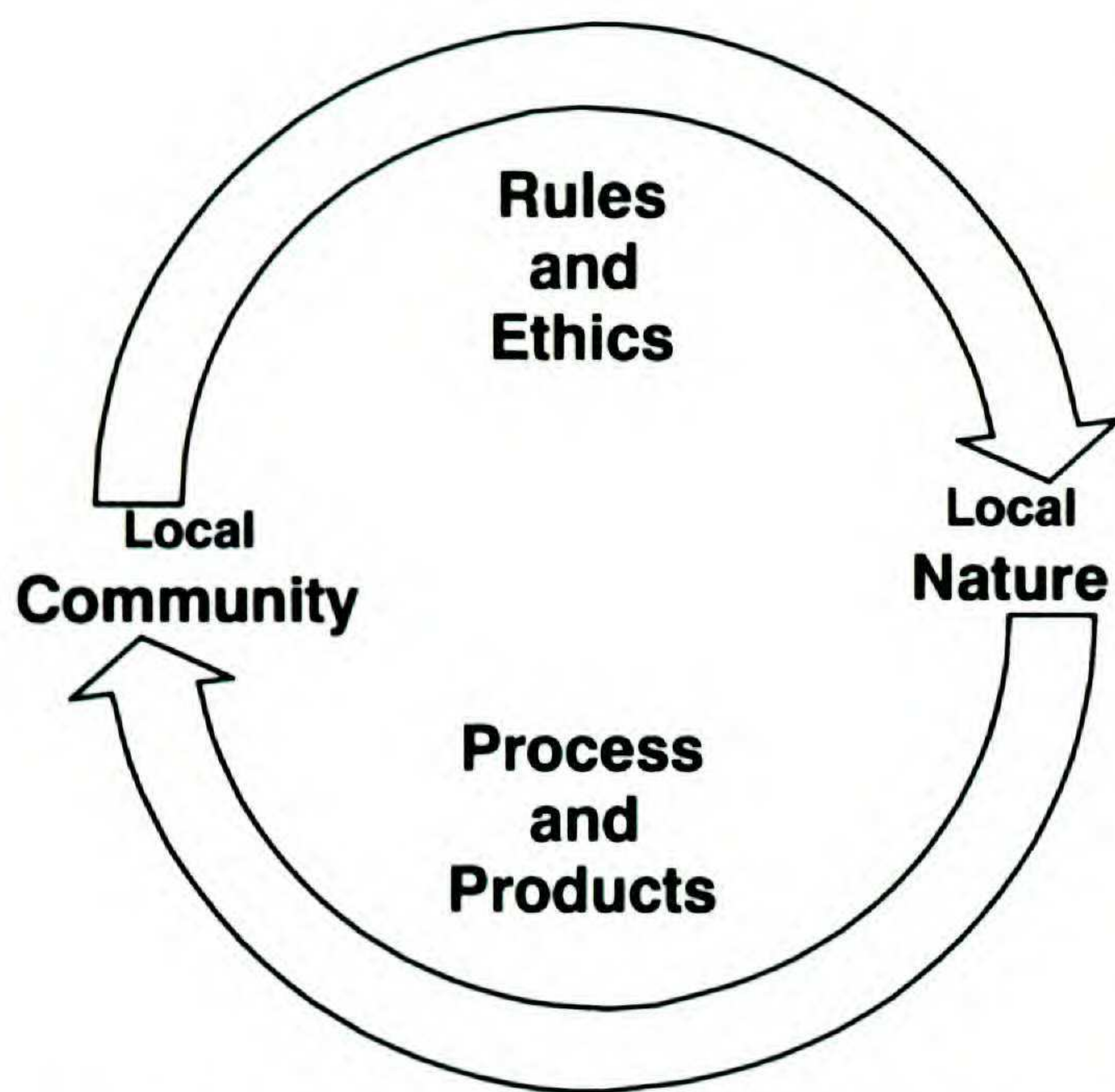


FIGURE 2. Grassroots support groups' standard frame for conservation discourse. The "balance with nature" is not necessarily stable.

blame for forest destruction under this standard frame of discourse.

Figure 2 shows an alternative that is increasingly used by environmental nongovernmental organizations (NGOs), particularly national-level NGOs in developing countries. This frame of discourse is based on a focus on nature conservation at the local level, and is very old among peoples indigenous to a particular locality. In this circle, nature and community are part of one whole. Products and processes are used by the community, but the community's rules govern how nature is appropriated. Feedback from poor management practices is recognized locally, and new controls are enacted to modify use so the ecosystem can rebound. In this circle, nature is treated as a power just as we treat the state: nature passes judgment and nature "sets the table" for negotiation of what is acceptable and unacceptable behavior among people.

A marker for this kind of frame of discourse is often the use of words like "harmony with nature" or "balance with nature," but it is probably better to think of this circle as a dynamic relationship in which the balance shifts back and forth over time. This relationship does result in extinction of some local populations of plants and animals, especially large mammals, but generally does not significantly lower overall local levels of biodiversity.

In this circle, poems, stories, proverbs, pictures, and local histories reinforce and maintain people's relationships with each other and nature. Local

space is seen as containing history and ancestors. Many forest dwellers around the world say something loosely translated into English as, "the ancestors will punish us if we do not take care of what they have given us." The nature-community circle is the key to personal identity. As one man in the Solomon Islands said (J. Cordell, pers. comm., 1991), "I couldn't sell my land to you, it would be like cutting off my arm and selling it to you. It would be of no use to you." Parting with his land would destroy him, and it was inconceivable to him that anyone could use that land and its resources without being part of his ancestral lineage and part of his community. Indigenous Amazonian societies, for example, generally conceive of their territory as having many vertical dimensions from the air down to the forest, the land, the water, and the underground. When Colombian indigenous communities were recently awarded tenurial rights to reserves for which they had been fighting, they were startled to learn that the reserves only gave them rights to the surface land, and not the forest, the water, the air, and the underground resources. They were upset at what had been taken away from them. They had not imagined that territory could be carved up in that way (E. Reichel, pers. comm., 1992).

As Figure 3 illustrates, at the local level human communities adapt differently from their neighbors, and their impacts on the same environment differ according to their culture, their community organizations, and their histories. Communities often develop institutional mechanisms for excluding neighboring communities from appropriating their resources. Warfare and trade form the borders between neighboring circles, but the borders are flexible and shift with time. Trading networks lead to exchange of resources between circles. This model is adequate to describe most relationships prior to the colonial era and subsequent expansion of the global economy.

Over the past 500 years, however, the situation has changed to one more like that shown in Figure 4. This diagram illustrates the economic development process from a global perspective. On the right are the local circles from the previous figures. On the left is the state-based Eurocentric elite community of which we are a part. It includes the "developed countries" as well as the elites of "developing countries." The elites of the world's states form a community with mutual financial interests. From colonial times to the present, the Eurocentric community has acted under market ethics and used violence, speed (*sensu* Virilio, 1978), and products to extract capital, information, raw materials, and



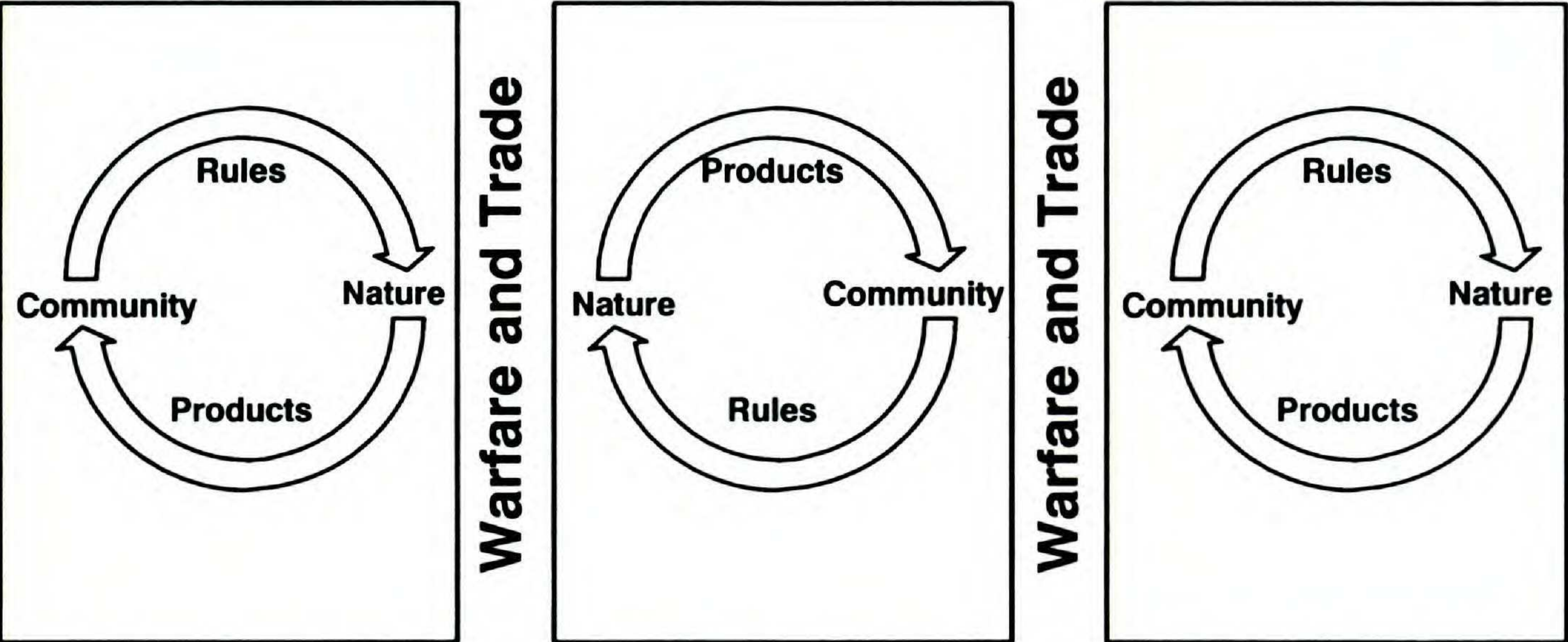


FIGURE 3. Model of global nature-community relationships prior to 1500. This model emphasizes the role of warfare and trade that influenced local use and management of nature.

labor from the local, culturally and biologically diverse nature-community circles around the world. Economic botanists participated in the extraction of information and genetic resources. Under market ethics, the market is allowed to be the primary allocator of resources without consideration for social or environmental impacts of that allocation.

Europeans and then neocolonial states have followed a process of breaking the community (as in the broken top and bottom circles in Fig. 4). They broke the authority of local organizations, local feedback processes, and local rules and ethics in

order to extract resources. Entrance into market economies weakens local cohesion as a few entrepreneurs emerge and claim individual rights over what had been communal resources. Many communities evolve new mechanisms to maintain resources after the entrance into the market economy, but this often depends on communal rights to control and allocate resources. This small-scale unraveling must be seen against the larger context of state-level direct or indirect usurpation of local resources. Indirectly, state-sponsored individual titling of land previously held by communities had

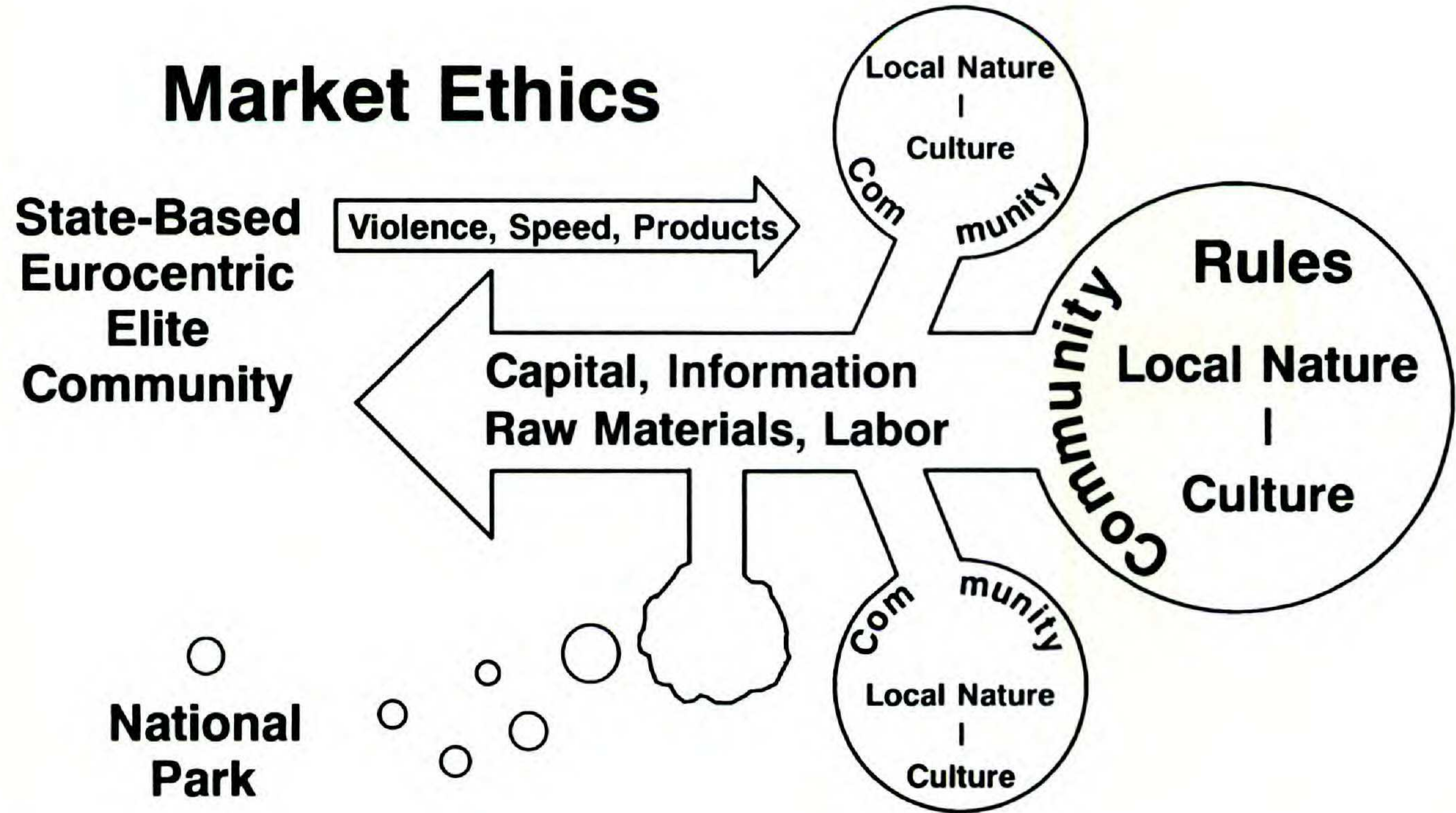


FIGURE 4. Model of global nature-community relationships during the colonial and neocolonial periods. This model emphasizes the destructive extraction of biodiversity.



often led to increased resource degradation and loss of forest. The state usually awards title to only one of those who have claims on the property in question in order to bring the resource into the capitalist system as a commodity. Those seeking titles are often entrepreneurs who then sell the forest to outsiders who have no long-term interest in maintaining the forest. In other cases, indigenous community lands are actively reorganized by development programs that award individual holdings to current residents and add settlers to the community mix, a practice that has had negative impacts on forest and other natural resources (Porter et al., 1991).

Historically, most states have directly usurped forests from local communities by assuming state's rights over forests in order to increase their tax base and export revenues from crops; they have extracted resources directly or promoted the conversion of forests to agricultural lands. In many places, states are executive committees of elites who make policies and laws enabling themselves to use their powers for their own personal benefit, not for the public good. States often claim authority to replant or manage forests, but they seldom take full responsibility for that obligation. Few states are held publicly accountable for meeting their obligations, and their forests continue to shrink under *de facto* open access conditions. In addition to direct state-sponsored deforestation, in many countries there is what has been called "institutional legitimization of deforestation" (G. Murray, 1988, unpublished). For example, titles are often only granted to deforested land, because by deforestation the owner demonstrates that he will put the land to a use that will generate tax revenue for the state. Settlers are often encouraged to move into lands claimed by indigenous peoples. The state's failure to recognize community rights to forests, and carry out its obligations to defend community rights in situations where those rights have been recognized, has contributed to the loss of biodiversity shown in Figure 4. The ultimate result of this process is that communities are broken, and their ability and commitment to maintaining their local natural base is weakened. This is shown in the diagram as local circles of biodiversity shrinking and disappearing (right to left). Communities attempt to adapt to the above stresses while maintaining biodiversity, but their levels of "good enough" biodiversity are down-graded as they accede to the shrinking process depicted in the diagram (Lynch & Alcorn, in press).

On our side of this equation, on the left, we do not realize the effects of our choices about what

we buy. We do not see how what we buy affects environments and peoples far away from us. There is no feedback loop to warn us that we are damaging their local natural resource base, yet, according to Paul Erhlich (1993), the richest 20% of the world's population (we Eurocentric elites) are responsible for 70% of the destruction of the world's environment. At the national level, as nature shrinks in the landscape, states are encouraged by conservation interests to establish national parks and reserves, which we know are essential but at best only protect a small bit of biodiversity and are often only paper parks. On the far righthand side of the diagram is the intact community blocking the extraction process and protecting local nature. Resistant circles like this one are usually found in remote areas, in the forests of the Philippines, the Amazon, Papua New Guinea, Zaire, and Panama, for example. On a global scale, there are fewer and fewer of such circles left.

This resistant community takes many forms. While it might initially appear that this circle is the same as the earlier local nature-community circles, it is not. Communities in these circles have often engaged in various acts of resistance over the past centuries without any outside help. Today, however, resistant communities are often supported by a coalition that includes some elements of the Eurocentric elites. Sometimes that assistance includes publicity about struggles over rights to biological resources. In Asia, Africa, and Latin America, desperate people continue to risk losing their lives by standing up before the most powerful elements of their governments and local power structures in order to save forests upon which they depend for livelihood and identity. The story of Chico Mendez's murder was made famous by international conservation organizations, but he is one of thousands who have died defending their rights to tropical forests.

Figure 5 shows the addition of the bottom arrow signifying supportive input under conservation ethics. The feedback and authority in the resistant circle remain local, but outsiders bring in capital, speed, information, and market linkages to support the local community in maintaining significant control over its piece of nature, in effect forming partnerships. This includes partnerships with the state. The role of the state can be negative, as I have described, but the state has an essential positive role to play in legitimizing and defending communities that are trying to manage their forests. That includes recognizing and defending communal tenurial rights, recognizing rights to forests and other economically valuable biodiversity, and en-



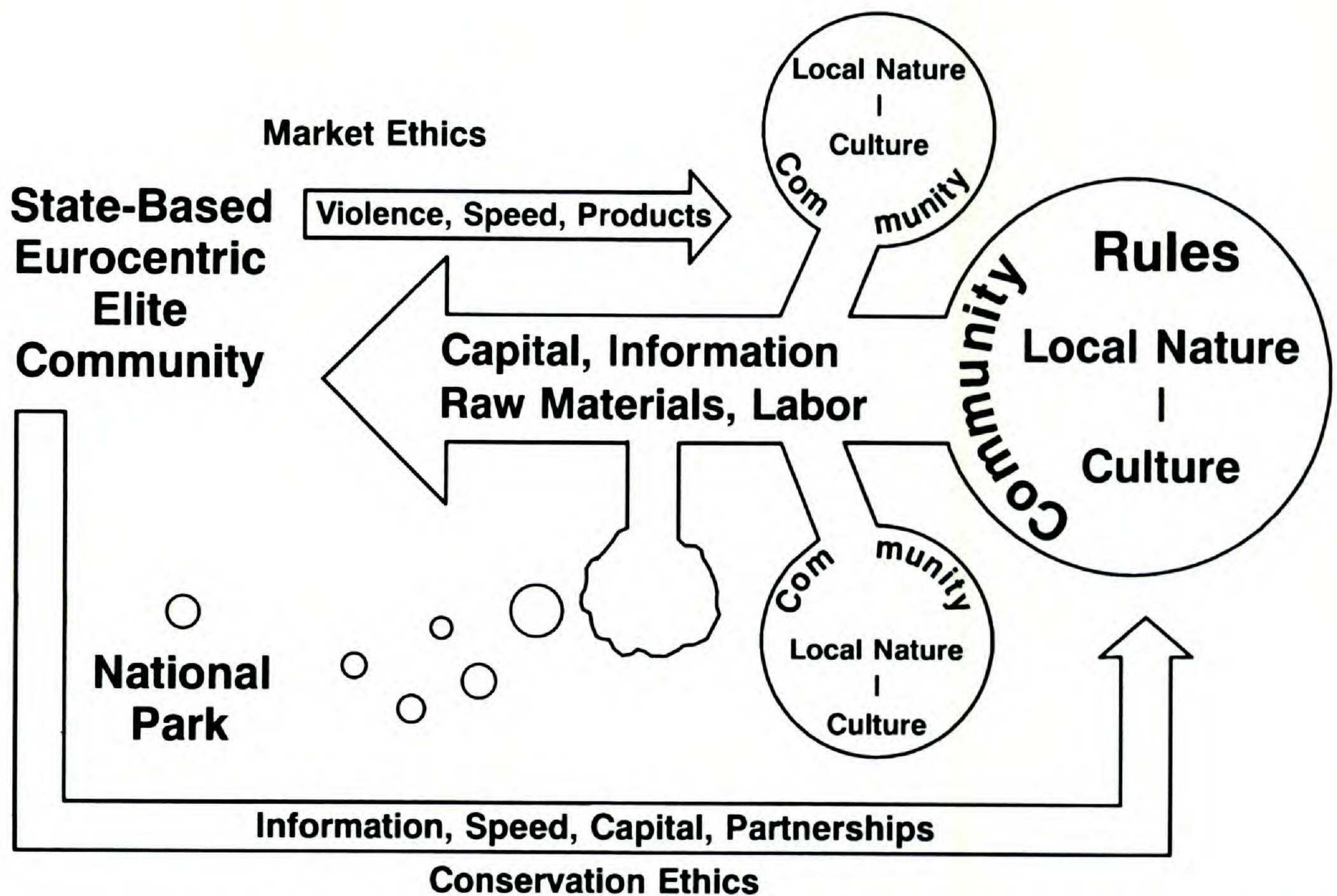


FIGURE 5. Alternative model of global nature-community relationships. This model offers a revised frame for conservation discourse.

ensuring that benefits from intellectual property rights are distributed to communities that live where useful biodiversity is found. India and Nepal, for example, have pioneered some unique forest “co-management” partnerships appropriate for South Asia. Another option is found in the forest leases being implemented and considered in Indonesia, the Philippines, and Thailand (Fox, 1993). In the Philippines, the state has prevented migrant farmers from entering forests that are formally leased to indigenous peoples. Other options include the extractive reserves and indigenous reserves of Latin America. Mexico’s ejidos and comunidades provide communal tenure and a haven for biodiversity (Toledo, 1992). Fully 70% of Mexico’s forest cover is on communally owned lands (Bray, 1991), but those forests are now in jeopardy under new Mexican privatization policies being enacted in support of the North American Free Trade Agreement (NAFTA).

#### THE NEW CONNECTION TO ECONOMIC BOTANY

What does this new trend of partnerships under conservation ethics have to do with economic botanists? What is the new connection? Economic botanists are now working to link conservation,

development, and respect for local rights. Various professional biological societies, including the Society for Economic Botany, have drafted ethical guidelines to encourage members to respect local rights. The World Wide Fund for Nature (Cunningham, 1993) recently published a review of ongoing initiatives, the issues, and alternatives for creating equitable partnerships in new natural products development.

The most high-profile and controversial effort to address these issues is the promotion of intellectual property rights to plants or knowledge about plant uses. Intellectual property rights, or IPR, has appeal, because it attempts to address equity issues and recognize the rights of disenfranchised groups. On the other hand, there are many questions about whether IPR is the appropriate tool for achieving these objectives (Axt et al., 1993). There is little evidence that states will be able to effectively distribute royalties back to the rural communities that were the original source of the plant or the knowledge. Given states’ past behavior, it is unlikely that benefits will be shared with marginal groups or used to support conservation in most countries. There are larger questions about whether species or knowledge about them should be owned by anyone. Representatives from some indigenous peoples’ or-



ganizations have stated that no one should own knowledge or species because they are part of God's creation. They further state that no one has the right to profit from knowledge that could be shared for the benefit of all. They are acting on their traditional values that support sharing benefits across the community. Many other indigenous groups, however, have gone on record declaring their intellectual property rights and demanding international protection for those rights (U.N. Working Group on Indigenous Populations, 1992). These groups recognize that their knowledge and plants are generating large profits for others, and those others are not sharing the profits. But the concept of collective rights is not well developed in Western law, which has focused on rights of the individual vis-à-vis the state (Axt et al., 1993).

For many, the issue of intellectual property rights is inseparable from the issue of land rights, which have been ignored for centuries. Both issues are seen as the reflection of the larger issue of human rights abuse against marginal communities. At this time, however, land rights and intellectual property rights are not being linked by international conventions, and it is not clear that developing royalty agreements will contribute to conservation or bring benefits to local communities.

In addition to their involvement with IPR agreements, economic botanists are also involved in on-the-ground efforts to establish or provide assistance to green enterprises that will empower local communities to enter this system in ways that are advantageous to those communities. Useful plants form the basis of many fledgling green enterprises today. Economic botanists are also providing assistance with surveys, rapid information exchange networks, and databases. These efforts are useful if they ensure that communities and grassroots nongovernmental organizations, not just the elite, have access to the information about useful plants, their markets, market dynamics, and prices.

Partnerships are being formed between researchers from universities and nongovernmental organizations to promote grassroots development and conservation. Partnerships between universities and local communities are also proving especially helpful. The prestige and profile of academic institutions alone can help politically to strengthen the state's commitment to defending communities' tenurial rights. The Amazon Program of the Woods Hole Research Center and its Brazilian collaborating organizations (including EMBRAPA, several universities, and others) is an outstanding example of a program promoting information sharing between researchers, govern-

ment agencies, and organizations representing rural communities in order to conserve forests (Nepstad & Schwartzman, 1992). The New York Botanical Garden's Institute of Economic Botany has forged innovative partnerships with the Belize Association of Traditional Healers, the Ix Chel Tropical Resource Foundation, Grinnell College, the Belize Center for Environmental Studies, and the Belize Forestry Department. Together they have created an ethnobiomedical extractive reserve (Balick et al., 1994).

Private sector companies that benefit from biodiversity and traditional ethnobotanical knowledge are also seeking ways to support communities in addition to direct profit sharing. For example, Shaman Pharmaceuticals founded The Healing Forest Conservancy to strengthen communities and conserve "biocultural diversity" through promoting sustainable harvest of natural products, enhancing opportunities for communication between forest societies and urban-based societies, and encouraging policymakers to develop initiatives that support indigenous institutions and foster the improved welfare of indigenous peoples (Anonymous, 1994).

Ecologists and botanists are helping in other ways. For example, some communities are seeking external assistance from scientists to ensure natural forest regeneration, after they have realized that decisions to market forest products are beginning to deplete their resource base. In other cases, communities need the help of ecologists or forestry specialists to certify that their community forests are not "degraded" or economically useless in order to disprove state claims that the useless condition of the forest warrants reforestation by concessionaires. The state often directly or indirectly funds concessionaires to cut down community forests in order to create plantations. This deprives communities of access to the many forest products on which they currently depend and repeats the historical process of human rights abuse and biodiversity depletion outlined earlier. When biologists provide officials and communities with information about the health of natural forests, the efficiency of natural regeneration for renewing forests, and the values of natural forest versus plantation, both biodiversity and local communities benefit.

Conservation organizations are expanding from their traditional focus on state management of national parks and reserves to support "integrated conservation and development" projects, known in conservationists' jargon as ICDPs or ICADs, that often involve co-management partnerships between the state and neighboring communities to support conservation and sustainable use of biotic resources



for the economic benefit of local communities (Brown & Wyckoff-Baird, 1992; Wright et al., in press).

Yet, in keeping with the standard frame of discourse in Figure 1, many people say, "But once 'these primitive people' get a little money they will destroy their natural environment in order to buy things." And they ask if community-based conservation requires restriction on development. My response is to note that no rural people are living in pristine conditions today. The people who are struggling to maintain their forests also use money, have plastic buckets, and wear polyester clothing. They use deodorant, and some of them have televisions, motorcycles, motorboats, and cars. They have been touched by the cash economy and by development. They interact with the market. Yet, they are concerned about the condition of their forests and are taking measures to manage them. They show us that development does not necessarily mean that people will no longer depend on their natural resources and consequently be expected to destroy their forests. Certainly as development proceeds, some communities abandon long-term concerns in favor of short-term gains, particularly when their tenurial rights are weak, but other communities do not (Alcorn, in press; Lynch & Alcorn, in press).

Figure 5 offers a more sophisticated frame of discourse for recognizing, communicating, and assessing the complex processes that threaten states' and rural peoples' efforts to conserve biodiversity—efforts that are invisible to those using the frame of discourse diagrammed in Figure 1. I encourage those whose immediate reaction is that local communities do not and/or will not conserve biodiversity to reconsider the situation using an alternative analytical framework including the factors raised in my discussion of Figure 5.

If one accepts the premise that local communities can and will conserve biodiversity, and works within the framework in Figure 5, the challenge becomes one of finding ways to identify and support local initiatives to link economic development with biodiversity conservation, traditional systems of knowledge, and local institutions including common property resource management systems (Alcorn, 1991; Gadgil et al., 1993; Seymour, in press). Conservationists and communities are increasingly joining in innovative partnerships and seeking the help of botanists in order to achieve local conservation and development goals. There is hope that more and more economic botanists will become aware of their relationships to the loss of biodiversity and use their expertise to play a positive role

in supporting equitable development and the conservation of biodiversity.

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